

Landraces of Barley Exhibit Superior Drought Resistance: Insights from Agro-Morphological and Physiological Analysis

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Introduction.

Erratic rainfall/less rainf in winter (IPCC 2024) Lack of irrigation facilities and infrastructure (Sah et al. 2020)



Prolonged drought in Terai region

Subjected to reduced the barley yield upto 10-100%, only one improved varieties has been released by NARC but not tolerant to drought

Does landraces have potential morphological traits to cope with drought????



- ✓ Important but marginalized crop in Nepal
- ✓ Highly nutritious and also poor farmer food and have high industrial values

Improved varieties are not meant to cope with drought

Results and Discussion

Table 1: Important trait drought stress indices exhibited by Barley landraces

Genotype	STI	SSI	YSI	Major Response
AFU 202501	1.78	-0.31	0.74	Partial dehydration avoidance
Saptari Local	0.72	-0.07	0.94	Early maturity (escape)
Gaushala Local	1.37	-0.60	0.50	High yield under control
NGRC 6010	0.13	-0.81	0.31	Highly sensitive

STI: stress tolerance indices, SSI: Stress susceptibility stress, YSI: Yield Stability index

Discussion

- Genotypes showed diverse **adaptation mechanisms** (escape vs. avoidance).
- **AFU 202501**: Maintained chlorophyll and yield under drought.
- **Saptari Local**: Short lifecycle minimized drought exposure.
- Chlorophyll retention strongly correlated ($r = 0.72$) with yield stability.

Conclusion

- **AFU 202501** and **Saptari Local** are promising drought-tolerant landraces.
- **Chlorophyll retention and phenological plasticity** are key indicators of tolerance.
- Findings aid **breeding programs** and **climate-resilient agriculture** in Nepal.

Methodology

Experimental Site: CNRM, Bardibas (Polyhouse, 2025)

Design: Two-factorial CRD (Stress $\times$ Genotype)

Drought Stress: 60 cb soil moisture tension for 7 days at CRI, tillering, and grain-filling stages

Parameters: SPAD chlorophyll, days to flowering/maturity, yield, stress indices (STI, SSI, GMP, MP, TOL, YSI)

Analysis: Genstat Ver. 2025, DMRT (5%)



1. Control condition 2. Drought condition maintained drought by tensiometer at 60cb for week

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